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(54) Radar system with active array antenna, elevation-responsive PRF control, and beam multiplex control.

(57) A multipurpose system provides radar surveillance for air traffic control purposes. The system includes four separate active phased-array antennas, each with ± 45° coverage in azimuth, from 0° to 60° in elevation. Each antema element of each phased-array antenna is coupled by a low-loss path to the solid-state amplifier associated with a transmit-receive (TR) module. Each antenna produces a sequence of pencil beams, which requires less transmitted power from the TR modules than a fan beam, but requires more time because the pencil beam must be sequenced to cover the same volume as the fan beam. In order to scan the volume in a short time, the PRF is responsive to the elevation angle of the beam, so higher elevation angles use a higher PRF. Low elevation angle beams receive long transmitter pulses for high power, and pulse compression is used to restore range resolution, but the long pulse results in a large minimum range within which targets cannot be detected. A second scan is provided at low elevation angles with a short transmitter pulse to fill in the short-range coverage. Beams at higher elevation angles transmit pulse widths which are shorter than beams at low elevation angles, so that the minimum range requirement is met without a second scan, which also reduces the time required for volumetric scan. The number of pulses which are integrated to produce a return increases off-axis, to restore system margin lost due to off-axis power gain reduction. The volumetric scan rate is increased by a dynamic scan regimen by which subsets of beams are pulsed with a high transmitter PRF but with a low effective beam PRF to reduce range ambiguity and preserve Doppler resolution without the usual increase of scan time. For best range resolution, Doppler processing is used, with range sidelobe pulse suppression applied separately to each Doppler frequency bin.

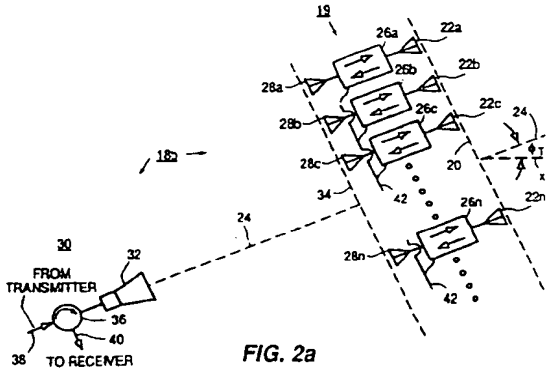

FIG. 2a

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EUROPEAN SEARCH REPORT

Application Number

EP 92 30 3498

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int. Cl. 5)
Y	EP-A-0 320 306 (NEC CORP.) * Abstract; page 2, lines 5-35; page 2, line 62 - page 5, line 27 * ---	1,5-7	G 01 S 13/42 G 01 S 13/22 G 01 S 13/58 G 01 S 13/87 H 01 Q 3/46
Y	US-A-4 951 059 (TAYLOR, Jr.) * Abstract; column 2, lines 28-68; column 4, line 19 - column 6, line 49 * ---	1,5-7	
A	US-A-4 901 032 (KOMIAK) * Abstract; column 1, lines 5-13 * ---	2-4	
A	US-A-3 833 904 (GEBHARDT et al.) * Abstract; column 1, line 33 - column 2, line 41; column 4, line 4 - column 5, line 44; column 7, line 51 - column 8, line 37; column 9, line 13 - column 12, line 62; column 16, lines 14-31; column 17, line 45 - column 18, line 38; columns 237-240, claims 1-15 * ---	1,5-7	
A	US-A-4 053 884 (CANTRELL et al.) * Abstract * ---	1,7	TECHNICAL FIELDS SEARCHED (Int. Cl.5)
A	AVIATION WEEK & SPACE TECHNOLOGY, vol. 133, no. 1, 2nd July 1990, pages 49-51, New York, US; B.D. NORDWALL: "Sweden develops new radar, computer for Gripen and airborne early warning" * Whole article * -----	1,7	G 01 S H 01 Q

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
THE HAGUE	17-02-1993	OLDROYD

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
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E : earlier patent document, but published on, or after the filing date
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